BARRICK

BARRICK RESOURCES (USA), INC.

May 1, 1991

Mr. Don A. Ostler, P.E.
Executive Secretary
Utah Water Pollution Control Committee
P.O. Box 16690
Salt Lake City, Utah 84116-0690

Dear Mr. Ostler:

Subject: Groundwater Quality Discharge Permit No. UGW450001

Barrick is in receipt of your letter dated April 26, 1991 concerning the Dump Leach Area No. 3 leakage collection system and your intent to modify the above referenced permit. This letter was received at the Mercur Mine April 29, 1991.

A formal response to your stated determinations 1 through 7 concerning the leakage collection system status is being prepared. Results of outside analytical work are anticipated shortly which will then allow us to complete and transmit our response to the Bureau.

A review of the Bureau's proposed permit modifications has been completed. Our comments on the Bureau's proposed language, which we presume are authorized under the provisions of Part IV.C of the permit, have been incorporated into the text of the appropriate permit sections and are attached for your review. We call your specific attention to the language presented for parts I.E.8.b (proposed) and I.G.4.c. While we agree that monitoring of fluids detected in the leakage collection system is necessary, the frequency of sampling proposed by the Bureau is excessive. The alternative presented by Barrick represents a more appropriate sampling frequency due to the (1) nature and source of the solution, (2) the solution's environmental consequence, and (3) the need to provide meaningful data on any solution characteristic variability.

We would also point out that, due to the excessively low and intermittent nature of the existing solution release into the leakage collection system, obtaining a representative sample may be impossible. Barrick will make every attempt to obtain representative samples necessary to satisfy our permit conditions.

Barrick Mercur Gold Mine
P.O. Box 838, Tooele, Utah 84074 Telephone (801) 268-4447 FAX(801) 266-4296

Please contact me or Glenn Eurick of my staff to discuss our proposed alternative language. Barrick remains committed to achieving a mutually agreeable resolution to this matter.

Sincerely,

Frank D. Wicks
Vice President and General Manager

FDW/cg

Attachment

cc: G. M. Eurick
C. L. Landa
C. L. Olson
T. B. Faddies
M. P. Richardson
R. R. Sacrison
D. P. Beatty
D. R. Bird (Parsons, Behle & Latimer)
G. W. Condrat (Dames & Moore)
W. Hedberg (DOGM)
J. Trujillo (Tooele County Health)

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*NOTE: Initialing (GE) indicates Barrick agreement with proposed Bureau language. Alternative Barrick language as shown.

I. SPECIFIC CONDITIONS

A. Ground Water Classification

Based on ground water quality data submitted by the permit applicant, ground water at the site is defined as Class II.

B. Background Ground Water Quality

1. Background for Existing Monitoring Wells - Based on the chemical characteristics of pregnant liquor from the existing Dump Leach No. 2, and existing ground water quality data from two monitoring wells at the Dump 3 site, background quality for wells MW-10 and MW-11 is defined in Table 1.

2. Background for Additional Compliance Monitoring Wells - After completion of additional compliance monitoring wells in accordance with Part I E (2), Barrick shall determine background ground water quality in compliance with the Accelerated Background Sampling requirements of Part I H (5), below.

C. Ground Water Protection Levels

1. Protection Levels for Existing Wells - Ground water quality at the existing monitoring wells MW-10 and MW-11 shall not exceed the ground water protection levels, defined in Table 1.

2. Protection Levels for Additional Compliance Monitoring Wells - after completion of additional compliance monitoring wells in accordance with Part I E (2), this permit maybe modified by the Executive Secretary.

Table 1

	Monitoring Well MW-11		Monitoring Well MW-10	
Parameter	Background Quality (mg/l)	Protection Levels (mg/l)	Background Quality (mg/l)	Protection Levels (mg/l)
pH	7.94 units	6.5-8.5 units	7.35	6.5-8.5 units
Fluoride	0.86	1.07[b]	0.91	1.13[b]
Nitrate (as N)	2.64	3.3[b]	2.22	2.77[b]
Arsenic	0.01[a]	0.012[c]	0.01[a]	0.012[c]
Barium	0.036	0.25[c]	0.035	0.25[c]
Cadmium	0.01[a]	0.01[d]	0.01[a]	0.01[d]
Chromium	0.01[a]	0.012[c]	0.01[a]	0.012[c]
Copper	0.01	0.25[c]	0.014	0.25[c]
Cyanide (total)	0.002[d]	0.05[e]	0.0043	0.05[e]
Lead	0.01[a]	0.012[c]	0.01[a]	0.012[c]
Mercury	0.0002[a]	0.0005[c]	0.0002[a]	0.0005[c]
Nickel	0.03	0.037[g]	0.0375	0.046[g]
Selenium	0.002[a]	0.0025[c]	0.002[a]	0.002[c]
Silver	0.01[a]	0.012[c]	0.01[a]	0.012[c]
Zinc	0.162	1.25[c]	0.147	1.25[c]
Total Dissolved Solids	612	765[b]	1180	1475[b]

Footnotes:

(a) Reported detection limit
(b) 1.25 x background
(c) 0.25 x g.w. quality standard
(d) Based on reported detection limit, however because it was equal to the g.w. quality standard, the background value and protection level may be modified later in accordance with Part I E (6)(b)(2)(ii) and Part IV of this permit.
(e) 0.25 x EPA D.W. Health Advisory (0.2 mg/l)
(f) Average of 2 samples
(g) 1.25 x background (EPA D.W. Health Advisory = 0.15 mg/l)

Amended February 6, 1991

D. Best Available Technology Standard

1. No Discharge Technology - the facility as designed will incorporate no-discharge technology through the use of a composite liner consisting of a synthetic flexible membrane/clay/synthetic flexible membrane liner system.

2. Authorized Design and Construction - the dump leach is limited to one cell approximately 1,700 feet long and 750 feet wide, for the cyanide leaching of sub-ores from the Mercur Mine. Construction of Dump No. 3 shall be in accordance with the requirements of the Construction Permit issued by the Executive Secretary with the following explicit requirements:

   a) The clay secondary liner shall be at least 3 feet thick below the permanent process pool.

   b) The clay secondary liner shall have a hydraulic conductivity no greater than 1.0×10^{-7} cm/sec at any point.

3. Process Pool Head Restriction - at no time during operation of the facility will the head of the pregnant liquor in the process pool exceed 30 feet above the lowest point on the uppermost flexible membrane liner.

4. Spill Containment - Barrick shall design and construct all pipelines, storage tanks, and carbon columns with a spill containment system that shall:

   a) Prevent any spills or leakage from any contact with the ground surface or ground water.

   b) Convey all spills or leakage to the lined impoundment of Dump Leach No. 3 or other containment mechanisms approved by the Executive Secretary.

   Affected structures of the facility include: reclaim water pipeline, leakage collection return pipeline, barren and pregnant solution pipelines, barren solution tank, caustic storage tank, descalant tank, carbon columns, and any associated pipeage, valves, pumps or other ancilliary equipment. The design and construction of the spill containment systems shall meet the requirements of the Construction Permit to be issued by the Executive Secretary.

5. Leakage Collected - any fluid collected in the leakage collection system shall be contained and returned to the Dump Leach No. 3 process circuit. In no case shall any leakage collection system fluids be discharged in a manner that is not in accordance with applicable State or Federal regulations. Any fluid collected shall be monitored in accordance with Part I E ~~8-7~~(e), below.

AE

Amended February 6, 1991
draft amendment April 24, 1991

E. Compliance Monitoring

1. Compliance Monitoring Method - compliance monitoring shall be accomplished by the use downgradient compliance monitoring wells and the use of control charts for intra-well comparisons in accordance with an EPA document entitled "Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities", February, 1989. Any other compliance monitoring or statistical method used by Barrick must receive prior approval from the Executive Secretary.

2. Compliance Monitoring Wells - Barrick shall install ground water monitoring wells to determine compliance with the requirements of this permit, in accordance with the following requirements:

   a) The wells shall be hydrologically downgradient of Dump Leach No. 3, as determined by the Hydrogeologic Report required in Part I H 3, below.

   b) Each well shall be completed exclusively in the uppermost aquifer. If more than one uppermost aquifer exists at the site, compliance monitoring wells will be installed into each uppermost aquifer.

   c) Each well shall be as close as practical to the dump leach.

   d) Each well shall be completed in the pathway(s), i.e., vertical zones and horizontal locations where potential leakage from the dump leach will migrate.

   e) The total number and location of compliance monitoring wells will be determined based on the hydrogeologic characteristics of the site, including the number of aquifers, the number and location of potential contaminant migration pathways, dispersion, etc.

   f) The compliance monitoring well network shall be complete and approved by the Executive Secretary before application of lixiviant on subore in the dump leach.

   g) Compliance monitoring can only be from monitoring wells that will be constructed in conformance with Part I H 4, below. Noncompliance with this section or the well construction provisions (Part I H 4) will be considered a failure to monitor.

3. Future Modification of the Monitoring Well Network - if at any time the Executive Secretary determines the monitoring well network to be inadequate, Barrick shall submit within 30 days of receipt of notification, a plan and compliance schedule to modify the monitoring well network.

Amended February 6, 1991

4. Noncompliance with the Protection Levels - any exceedance of the protection levels at any downgradient compliance monitoring well shall constitute noncompliance with this permit and may subject the permittee to enforcement action.

5. Compliance Monitoring Period - monitoring shall commence upon completion of the monitoring systems required by this permit, and shall continue through the life of the permit.

6. Monitoring Frequency - measurements or analysis done for monitoring will be conducted in compliance with Part I E 7, below, and reported to the Executive Secretary as per the requirements of Part I G.

7. Quarterly Ground Water Monitoring Requirements

   a) Water Level Measurements - water level measurements shall be made quarterly in each monitoring well prior to any collection of ground water samples. These measurements will be made from a permanent single reference point clearly demarcated on the top of the well or surface casing. Measurements will be made to the nearest 0.01 foot.

   b) Ground Water Quality Sampling - grab samples of ground water from both upgradient and downgradient monitoring wells will be collected for chemical analysis on a quarterly basis, in conformance with a Q.A./Q.C. Ground Water Monitoring Plan that has been approved by the Executive Secretary (Part I H 1, below).

      1) Analysis by Certified Laboratories - analysis of any ground water sample shall be performed by laboratories certified by the State Health Laboratory.

      2) Ground Water Analytical Methods - methods used to analyze ground water samples must comply with the following:

         i) Are methods cited in UAC R448-6-6.3A(13), and

         ii) Have detection limits which are less than the ground water protection levels found in Part I C, Table 1. In the case of cadmium, cyanide (total) and nickel, the detection limits shall be less than or equal to 0.002 mg/l, 0.02 mg/l and 0.015 mg/l, respectively.

draft amendment April 24, 1991

3) Analysis Parameters - the following analyses will be conducted on all ground water samples collected:

i) Field Parameters - pH, temperature, and specific conductance (Relocate below)
~~Amended February 6, 1991~~

ii) Laboratory Parameters - including:

- Major Anions and Cations: chloride, sulfate, carbonate, bicarbonate, sodium, potassium, magnesium and calcium.
- Protection Level Parameters - found in Part I C, above.
- Weak Acid Dissociable Cyanide
- Cyanide Degradation Products, including: ammonia and nitrite.
- Other parameters of potential concern, including: thallium.

ATE ~~8.e)~~ Leakage Collection System Monitoring

ATE a)~~1)~~ Observation - visual observation of both the upper and lower leakage collection systems ~~tank~~ will be conducted daily to determine the occurrence of any fluid discharge ~~presence of fluids~~.

See proposed language

b)~~2)~~ Sampling if Fluids Present - if a discharge of fluids is ~~are~~ observed from ~~in~~ either the upper or lower leakage collection systems ~~tank~~, the permittee will collect representative samples, if possible, of the fluid for chemical analysis according to the following schedule and parameters: ~~on a quarterly basis.~~ and the approved QA/QC groundwater quality monitoring plan (Part I.H.1)

1) ~~Daily~~ Weekly Monitoring: flow rate or total daily flow and field pH, temperature, and specific conductance.

2) ~~Weekly~~ Monthly Monitoring: Analysis parameters shall be the same as those required for ground water monitoring in Part I E 7(b)(3), above.

Sample collection shall conform to the approved Q.A./Q.C. Ground Water Monitoring Plan in Part I H 1, below. These fluids will be managed as per the requirements of Part I D 4, above.

ATE ~~9.d)~~ Process Pool Monitoring - Barrick shall monitor the level of the pregnant liquor in the production cistern on a daily basis. These measurements shall be made from a single reference point of known elevation at the top of the production cistern. All measurements will be made to nearest 0.1 foot.

ATE ~~10.8.~~ Post-Closure Monitoring - post-closure monitoring shall conform to the requirements of an approved Post-Closure Monitoring Plan (Permit Part I H 8).

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F. Non-Compliance Status

1. Probable Out-of-Compliance Status - Barrick shall evaluate the results of each round of ground water sampling and analysis to determine any exceedance of the ground water protection levels found in Part I C, above. Upon determination by the Barrick that a ground water protection level has been violated at any downgradient compliance monitoring well, Barrick shall:

   a) Immediately resample all the monitoring wells, submit the analytical results thereof, and notify the Executive Secretary of the probable out-of-compliance status within 30 days of the initial detection.

   (Relocate below)
   ~~Amended February 6, 1991~~

   b) Immediately implement an accelerated schedule of monthly ground water sampling and analysis, consistent with the requirements Part I E 7(b) of this permit. This monthly sampling will continue for at least two months or until the compliance status can be determined by the Executive Secretary. Reports of the results of this sampling will be submitted to the Executive Secretary as soon as they are available, but not later than 30 days from each date of sampling.

2. Out-of-Compliance Status

   a) Notification and Accelerated Monitoring - upon determination by the permittee, in accordance with UAC R448-6-6.17, that an out-of-compliance status exists, the permittee shall:

      1) Verbally notify the Executive Secretary of the out-of-compliance status within 24 hours, and provide written notice within 5 days of the detection, and

      2) Immediately implement an accelerated schedule of monthly ground water monitoring which shall continue for at least two months or until the facility is brought into compliance.

   b) Source and Contamination Assessment Study Plan - within 30 days of the verbal notice to the Executive Secretary required in Part I F 2(a), above, the permittee shall submit an assessment study plan and compliance schedule for:

      1) Assessment of the source or cause of the contamination, and determination of steps necessary to correct the source.

      2) Assessment of the extent of the ground water contamination and any potential dispersion.

      3) Evaluation of potential remedial actions to restore and maintain ground water quality, and ensure that the ground water standards will not be exceeded at the downgradient compliance monitoring wells.

G. Reporting Requirements

AE 1. Quarterly Ground Water Monitoring - monitoring required in Part I E 7, above, shall be reported according to the following schedule, unless modified by the Executive Secretary:

Quarter		Report Due On
1st	(Jan., Feb., March)	April 15
2nd	(April, May, June)	July 15
3rd	(July, Aug., Sept.)	October 15
4th	(Oct., Nov., Dec.)	January 15

(Relocate below)
~~Amended February 6, 1991~~

2. Water Level Measurements - water level measurements from ground water monitoring wells will be reported in both measured depth to ground water and ground water elevation above mean sea level.

3. Ground Water Quality Sampling - reporting will include:

a) Field Data Sheets - or copies thereof, including the field measurements, required in Part I E 7(b)(3), above, and other pertinent field data, such as: well name/number, date and time, names of sampling crew, type of sampling pump or bail, measured casing volume, volume of water purged before sampling.

AE b) Results of Ground Water Analysis - including date sampled, date received, ion balance; and the results of analysis for each parameter, including: value or concentration, units of measurement, reporting limit (minimum detection limit for the examination), analytical method, and the date of the analysis.

AE 4. ~~Observation of the~~ Leakage Collection System Monitoring ~~Tank~~ - Barrick shall report the results of leakage collection system monitoring required by Part I E 8 on a monthly basis, on or before the 15th day of the following month, including ~~reporting will include~~:

AE a) Daily presence or absence of fluid

AE b) Daily volume or flow rate of fluid from each collection system. ~~observed in the tank, if present.~~

See proposed language

c) Results of ~~daily~~ weekly and ~~weekly~~ monthly sampling and analysis of collected leachate fluids required in Part I E 8, above. The report of these results will meet the same requirements for ground water samples in Part I G 3, above.

d) The fate or current disposition of the fluids in the tank.

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5. Process Pool Head Monitoring - Barrick will report the results of head monitoring in the dump leach required in Part I E 9 on a monthly basis, on or before the 15th day of the following month, including: ~~reporting will include:~~

   a) Number of head measurements made each day during the month ~~quarter~~.

   b) Daily minimum, maximum, and average values in ~~both feet of elevation above mean sea level and~~ feet of head above the lowest point on the uppermost flexible membrane liner.

6. Spill Reporting - Barrick shall report as per UCA 26-11-15 any spill or leakage which is not totally contained by a collection system in compliance with Part II I of this permit.

7. Post-Closure Monitoring - reporting of post-closure monitoring shall comply with the requirements of an approved Post-Closure Monitoring Plan (Part I H 9).

~~Amended February 6, 1991~~
(Relocate below)

H. Compliance Schedule

1. Q.A./Q.C. Ground Water Monitoring Plan - Barrick will modify the Q.A./Q.C. Ground Water Monitoring plan submitted with the permit application (Appendix C), in accordance with Executive Secretary comments dated March 20, 1990 (Attachment 2) and resubmit within 30 days for Executive Secretary approval. After approval the plan shall become an enforceable appendix to this permit.

2. Contingency Plan - Barrick will submit a Contingency Plan for Executive Secretary approval within 60 days of the effective date of this permit. Under no condition will subore be placed in the dump leach without prior Executive Secretary approval of the Contingency Plan. This Contingency Plan must include actions to immediately stop or abate the discharge of fluids, and bring the facility back into compliance with the Ground Water Protection Levels of Part I C of this permit. This plan must include steps such as:

   a) Immediate cessation of operation.

   b) Removal of all fluids in the dump leach as rapidly as possible.

   c) Installation of pumping wells to recover the contaminants released, and to regain and maintain the ground water protection levels (Part I C) at the compliance monitoring wells.

   d) Neutralization and closure of the dump leach.

   e) Other actions that will immediately prevent leachates from leaving the dump leach.

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3. Dump No. 3 Site Hydrogeologic Report - Barrick shall complete a site specific hydrogeologic investigation at the Dump No. 3 Site and submit a hydrogeologic report within 30 days of the effective date of this permit. This report must receive Executive Secretary approval before any application of lixiviant onto the subore in the dump leach. The report shall justify how the design of the ground water monitoring well network meets or will meet the requirements of Part I E (2). If the report fails to meet these requirements, the Executive Secretary will require additional wells and study(s), in the order to adequately define the pathway(s) of any potential contaminant release and construct a viable ground water monitoring well network. The hydrogeologic report must include at least the following:

   a) Hydrostratigraphic Description - a geologic description of each geologic formation, member, or unit at the site and its individual hydrologic characteristics, including: saturation, porosity, hydraulic conductivity and hydraulic conductivity isotropy. Where pertinent, other geologic features must also be described including faults, joints, and other fractures. The description must also concisely describe which formations, members, and/or units behave as aquifers or aquitards.

   b) Geologic Map - illustrating surface outcrops, extent, and attitude of geologic formations, members, units and other pertinent stratigraphic and structural features consistent with USGS nomenclature and map standards. This map must be superimposed on a topographic base map at a scale of at least 1:2400 (1"=200') or other scale approved by the Executive Secretary, and must be inclusive of the Dump Leach No. 3 site and pertinent vicinity. This map must illustrate all pertinent man-made features, including wells and the dump leach; and also illustrate the strike of the hydrogeologic cross-sections required below.

   c) Potentiometric Map - at the same scale as the geologic map required above and consistent with accepted standards and practices, the potentiometric map must illustrate the ground water table elevation of each uppermost aquifer beneath the Dump Leach No. 3 site. Water level elevations measured from wells or springs will be shown and contoured on the map. Direction(s) of hydraulic gradient will also be displayed on the map for each aquifer. Known contours will be distinguished from suspected or inferred contours. Other pertinent geologic, hydrologic, or man-made features will also be displayed, including the location of all existing monitoring wells.

   d) Hydrogeologic Cross-Sections - at the same horizontal scale as the Geologic and Potentiometric Maps required above, and consistent with accepted standards and practices, at least two (2) hydrogeologic cross-sections will be prepared: one parallel to and along the major direction of hydraulic gradient, and the second at right angles to the first. If more than one aquifer exists at the site, a set of two (2) hydrogeologic cross-sections will be prepared for each aquifer. The cross-sections will depict the subsurface expression of data illustrated on the Geologic and Potentiometric Maps required above, including geologic formations and features, hydraulic gradient, the profile of the bottom liner of the dump leach and the location and depths of the upgradient and downgradient compliance monitoring wells.

e) Hydrogeochemical Description - ground water chemistry data from the monitoring wells and/or nearby springs will be presented to support any interpretations provided on or in the required maps and descriptions above. These analyses shall include the major cations and anions (see Part I E 7(b)(3)(ii), above) and may include other distinctive parameters or environmental isotopes. All hydrochemical facies identified and all analytical data used in this evaluation must be keyed to the Potentiometric Map required, above.

4. Monitoring Well Requirements

a. Construction Requirements - Monitoring well construction shall conform to the criteria found in the EPA RCRA Ground Water Monitoring Technical Enforcement Guidance Document, 1986, OSWER-9950.1 (RCRA TEGD). (Relocate below)
~~Amended February 6, 1991~~

b. Monitoring Well As-Built Report - diagrams and description describing the final completion of the monitoring wells shall be submitted within 30 days of well construction. This report will include:

1) Casing: depth, diameter, type of material

2) Screen: length, depth interval, diameter, material type, slot size

3) Sand Pack: depth interval, material type and grain size

4) Annular Seals: depth interval, material type

5) Surface Casing(s) and Cap: depth, diameter, material type

6) Elevation: ground surface and elevation of water level measuring point in feet above mean sea level.

5. Accelerated Background Sampling - ground water quality samples will be collected and analyzed from the monitoring well(s) required in Part I E 2, above, in compliance with the following requirements:

a) Samples will be collected twice per month beginning within 30 days of well completion

b) Each sampling event or episode will include independent grab samples.

c) Sampling parameters will include those required in Part I E 7(b)(3) of this permit.

d) Sampling will continue fore each compliance monitoring well for at least one year following well completion. After Executive Secretary approval sampling will be relaxed to single grab samples as per the requirements of Part I E 7(b), above.

e) Sampling methods will conform to the approved Q.A./Q.C. Ground Water Monitoring Plan required in Part I H 1, above. Analytical methods will conform to the requirements of Part I E 7(b)(2).

f) The results of this sampling will be reported to the Executive Secretary on a monthly basis after completion of each compliance monitoring well. Reporting requirements thereof shall comply with Part I G (2) and (3) above.

g) Barrick shall submit a Background Ground Water Quality Report for each compliance monitoring well, summarizing the results of this sampling within 30 days of the completion of the one year sampling required in Part I H 6(d), above. This report will provide the following data for each required parameter:

1) Value or concentration

(Relocate below)
~~Amended February 6, 1991~~

2) Arithmetic mean ($\bar{x}$)

3) Variance (s^2) or standard deviation (s)

Based on this information, the Executive Secretary may modify the ground water protection levels in Part I C of this permit.

6. Conceptual Closure Plan - In coordination with the requirements of other regulating agencies, Barrick will modify the Closure and Reclamation Procedures submitted in the Dump Leach No. 3 Design Document (February, 1990, p.34), to address comments provided by the Bureau of Water Pollution Control in a letter of May 7, 1990. Barrick shall submit the modified document as a Conceptual Closure Plan for Executive Secretary approval within 60 days of the effective date of this permit. This plan will form the basis for a final closure plan that will be prepared by Barrick at a date more imminent to closure.

7. Anticipated Date of Closure - in order to establish a schedule by which to finalize the closure plan Barrick shall disclose the anticipated date of closure for Dump Leach No. 3 to the Executive Secretary upon application for permit renewal (6 months before permit expiration).

8. Conceptual Post-Closure Monitoring Plan - In coordination with the requirements of other regulating agencies, Barrick shall submit within 60 days of the effective date of this permit a conceptual plan for monitoring the dump leach after cessation of operations and closure, for Executive Secretary approval. This plan must be consistent with guidance provided by the Bureau of Water Pollution Control in a letter of May 7, 1990, and will form the basis of a final plan to be formulated by Barrick at the time of closure.

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9. ~~Notice of Final Dump Leach Construction and Commencement of Operation—within 30 days of the final completion of dump leach construction the permittee will notify the Executive Secretary in writing that the construction has been completed and operation is underway.~~